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## INSERT TO ACCOMPANY BUREAU OF STANDARDS CIRCULAR 25

### VIII. STANDARD ANALYZED SAMPLES ISSUED OR IN PREPARATION

The samples are numbered consecutively nearly in the order of issuance of the first representative of each kind. Renewals of a sample are indicated by the original number, with an added letter to denote its intended relation. Thus, 5a is the first renewal by the Bureau of Standards of the original Iron C. In this way a given number will always represent a material of fixed, or approximately fixed, composition. Numbers missing from the series in the following table represent samples of which the supply has become exhausted, and which it is not the present intention to replace.

Sample number	Name	Constituents determined	Weight of sample in grams	Fee per sample with certificate <sup>1</sup>
1	Argillaceous limestone	Complete analysis	100	\$1.00
2	Zinc Ore D	Zinc	100	1.00
4a	Iron B, Renewal	C, Si, Ti, P, S, Mn	150	2.00
5a	Iron C, Renewal	C, Si, Ti, P, S, Mn, Cu	150	2.00
6a	Iron D, Renewal	C, Si, Ti, P, S, Mn, Cu	150	2.00
8a	Steel, Bessemer, 0.1 C Renewal	C, Si, P, S, Mn	150	2.00
9a	Steel, " 0.2 C Renewal	C, Si, P, S, Mn	150	2.00
10b	Steel, " 0.4 C Renewal	C, Si, P, S, Mn, in preparation	150	2.00
11a	Steel, B. O. H., 0.2 C Renewal	C, Si, P, S, Mn	150	2.00
12a	Steel, B. O. H., 0.4 C Renewal	C, Si, P, S, Mn	150	2.00
13a	Steel, B. O. H., 0.6 C Renewal	C, Si, P, S, Mn	150	2.00
14a	Steel, B. O. H., 0.8 C Renewal	C, Si, P, S, Mn	150	2.00
15a	Steel, B. O. H., 0.1 C Renewal	C, Si, P, S, Mn	150	2.00
16a	Steel, B. O. H., 1.0 C	C, Si, P, S, Mn, in preparation	150	2.00
17	Sugar	Calorimetric and saccharimetric value	60	2.00
18	Steel, A. O. H., 0.1 C	C, Si, P, S, Mn	150	2.00
19a	Steel, A. O. H., 0.2 C Renewal	C, Si, P, S, Mn (Cu, Cr, Mo, V)	150	2.00
20	Steel, A. O. H., 0.4 C	C, Si, P, S, Mn	150	2.00
21	Steel, A. O. H., 0.6 C	C, Si, P, S, Mn	150	2.00
22	Steel, Bessemer, 0.6 C	C, Si, P, S, Mn	150	2.00
23	Steel, Bessemer, 0.8 C	C, Si, P, S, Mn	150	2.00
24	Steel, Vanadium, 0.15 V	C, Si, P, S, Mn, V (Ni, Cr, Cu, Mo)	150	2.50
25	Manganese Ore	Mn, Available O	100	1.50
26	Crescent Iron Ore	Al <sub>2</sub> O <sub>3</sub> , CaO, MgO	150	1.50
27	Sibley Iron Ore	SiO <sub>2</sub> , P, Fe	150	2.00
28	Norrie Iron Ore	Mn (low)	100	1.50
29	Magnetite Iron Ore (titaniferous)	Full analysis	150	2.00
30	Steel, Chrome-vanadium	C, Si, P, S, Mn, Cr, V (Ni, Cu, Mo)	150	2.50
31	Steel, Chrome-tungsten	C, Si, P, S, Mn, Cr, W (Ni, Cu, Mo, V)	150	2.50
32	Steel, Chrome-nickel	C, Si, P, S, Mn, Cr, Ni (Co, Cu, Mo)	150	2.50
33	Steel, Nickel	C, Si, P, S, Mn, Ni (Co, Cr, Cu, W, Mo)	150	2.50
34	Steel, A. O. H., 0.8 C	C, Si, P, S, Mn (Cu, Cr, Mo)	150	2.00
35	Steel, A. O. H., 1.0 C	C, Si, P, S, Mn (Cu, Cr)	150	2.00
36				
37	Brass, Rolling Mill	In preparation	150	3.00
38	Naphthalene	Calorimetric value	50	2.00
39	Benzolic acid	Calorimetric value	50	2.00
40	Sodium oxalate	Oxidimetric value	120	2.00
			200	3.00
41	Dextrose	Reduction value	70	2.00
			140	3.00

<sup>1</sup> See Paragraph IX, Circular 25, for discounts and ordering and shipping regulations.

The regulations of this Department  
require PREPAYMENT before Standard  
Samples can be shipped.

Make remittance payable to the "Secretary  
of Standards" with your order to avoid delay.

## IX. SUMMARY OF ANALYSES

In general the values here given represent the averages of all determinations. In certain cases, for reasons explained on the certificates, other values are given in these tables and are recommended by the Bureau of Standards.

## AVERAGED ANALYSES

## Irons

Number	Sample	Total carbon	Graphite	Combined carbon	Silicon	Titanium	Phosphorus gravimetric
4a	B			0.67	1.37	0.062	0.102
5a	C	2.77	2.22	0.55	1.84	0.074	0.189
6a	D	2.46	1.85	0.61	2.57	0.081	0.526

  

Number	Sample	Phosphorus permanganate titration	Phosphorus alkali titration	Sulphur by oxidation	Sulphur by evolution	Manganese	Copper
4a	B	0.105	0.104	0.039	0.036	1.04	
5a	C	0.196	0.193	0.0354	0.0335	0.744	0.06
6a	D	0.540	0.545	0.044	0.034	1.54	0.043

## Steels

Number	Kind of sample with approximate carbon content	Carbon			Silicon	Phosphorus	Sulphur		Manganese
		Direct combustion	Solution and combustion	Colorimetric			By oxidation	Evolved as hydrogen sulphide	
	BESSEMER								
8a	0.1	0.084	0.083	0.088	0.005	0.094	0.082	0.082	0.536
9a	0.2	0.253	0.257	0.250	0.027	0.112	0.063	0.062	0.918
10b	0.4	0.380	0.374	0.390	0.046	0.120	0.050	0.048	0.665
22	0.6	0.591	0.587	0.605	0.077	0.102	0.066	0.063	0.708
23	0.8	0.805	0.806	0.803	0.150	0.109	0.061	0.057	0.775
	BASIC OPEN-HEARTH								
15a	0.1	0.109	0.115	0.107	0.009	0.0066	0.028	0.030	0.372
11a	0.2	0.223	0.227	0.227	0.097	0.008	0.041	0.039	0.620
12a	0.4	0.363	0.366	0.360	0.012	0.012	0.035	0.036	0.419
13a	0.6	0.579	0.581	0.585	0.116	0.014	0.032	0.032	0.635
14a	0.8	0.813	0.814	0.83	0.10	0.025	0.039	0.038	0.320
16a	1.0								

## Steels—Continued

Number	Kind of sample with approximate carbon content	Carbon			Silicon	Phosphorus	Sulphur		Manganese
		Direct combustion	Solution and combustion	Colorimetric			By oxidation	Evolved as hydrogen sulphide	
	ACID OPEN-HEARTH								
18	0.1	0.101	0.104	0.097	0.016	0.056	0.057	0.057	0.412
19a	0.2	0.205	0.214	0.20	0.032	0.084	0.071	0.068	0.85
20	0.4	0.378	0.376	0.390	0.059	0.031	0.044	0.044	0.486
21	0.6	0.591	0.592	0.590	0.081	0.025	0.050	0.049	0.559
34	0.8	0.84	0.84	0.85	0.18	0.095	0.029	0.029	0.70
35	1.0	1.03	1.03		0.17	0.033	0.027	0.027	0.30

## Alloy Steels

Number	Kind	Carbon <sup>2</sup>		Silicon	Phosphorus	Sulphur	Manganese	Vanadium	Chromium	Nickel	Tungsten
		Direct combustion	Solution and combustion								
24	Vanadium	0.350	0.348	0.303	0.035	0.027	0.669	0.15	0.007	0.009	
30	Chrome-vanadium	0.372	0.374	0.114	0.043	0.029	0.563	0.21	1.35	0.117	
31	Chrome-tungsten	0.599		0.11	0.013	0.019	0.154	Trace	3.50	Trace	19.55
32	Chrome-nickel	0.375	0.370	0.096	0.018	0.025	0.214		0.89	1.62	
33	Nickel	0.278	0.280	0.11	0.026	0.038	0.551		0.12	3.33	0.15

## Argillaceous Limestones

(Cf. J. Am. Chem. Soc. 28, p. 223; 1906.)

Number	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	Fe <sub>2</sub> O <sub>3</sub>	MnO	CaO	MgO	K <sub>2</sub> O
1	18.15	0.22	5.70	0.18	1.72	0.04	37.65	1.94	1.15
Number	Na <sub>2</sub> O	H <sub>2</sub> O 100°—	H <sub>2</sub> O 100°+	S	SO <sub>2</sub>	CO <sub>2</sub>	C	Total	Ign. loss
1	0.33	0.16	1.51	0.27	0.013	30.68	0.65	100.25	32.27

## Zinc Ore

(Cf. J. Am. Chem. Soc. 29; p. 262; 1907.)

Number	Zinc—General average
2	31.43

## Manganese Ore

Number	Total manganese	Available oxygen	Calculated MnO <sub>2</sub>
25	56.25	16.1	87.5

<sup>2</sup> It is believed that these results for carbon may be slightly lower than the truth. The matter is being investigated at the Bureau and elsewhere.

## Lake Superior Iron Ores

Number	Name	SiO <sub>2</sub>	TiO <sub>2</sub>	P	Al <sub>2</sub> O <sub>3</sub>	Fe	Mn	CaO	MgO
26 27 28	Crescent Sibley Norrie	<sup>3</sup> 5.03 0.76	<sup>3</sup> 0.07	<sup>3</sup> 0.040 0.037	1.02	<sup>3</sup> 58.62 69.20	0.465	2.56	3.27

## Magnetite Iron Ore

Number	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	V <sub>2</sub> O <sub>5</sub>	FeO	Fe <sub>2</sub> O <sub>3</sub>	Fe	MnO
29	12.02	0.99	1.91	0.08	24.78	52.20	[55.75]	0.09

Number	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	H <sub>2</sub> O+	CO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	S
29	2.90	2.01	0.51	0.45	0.47	0.68	1.01	0.025

## PURE CHEMICALS

## Sugar

Number	Sucrose by polarization	Moisture	Reducing substances	Ash
17	99.98	<0.01	0.004	0.003

## Naphthalene

Number	S	
38	<0.05	Cf. method of purification, pp. 8-9

## Benzoic Acid

Number	
39	No impurities could be detected Cf. method of purification, p. 9

## Sodium Oxalate

Number	Water		NaHC <sub>2</sub> O <sub>4</sub>	S	K	Fe	Cl	Organic impurity
	105°	240°						
40	0.005	0.027	<0.01	Very faint trace	Very faint trace	None	<0.002	None

<sup>3</sup> Values derived from a small number of determinations at the Bureau of Standards, and not so well established as the other values.